PASSAGE III

HUMANITIES: *Mythology of the Chinese Zodiac*

Everyday, one takes for granted the ease of finding out what date it is. This is simplified to such a great degree by following the Gregorian calendar, based on the solar cycle, which keeps track of 365.25 days each year. This has not always been the case, however. In ancient China, the calendar was based on the lunar cycle, and consisted of a repeating twelve-year sequence, each named for a different animal.

The origin of the twelve animals is mythological, with the story being passed down from generation to generation. A common telling of the tale recounts a celebration to honor the Jade Emperor; all of the animals were expected to pay tribute to him on the night of the New Year and the first twelve to arrive would receive a great distinction.

In order to reach the Emperor's Palace, the animals were required to cross a fast-moving river. The cunning rat arrived first, climbed atop the ox, who was a much stronger swimmer than the rat, and jumped off of the ox right before reaching shore, so as to win the race. The ox received second place, followed shortly thereafter by the tiger – the strength of both animals allowed them to finish quickly. The rabbit followed, with his agility, by jumping from stone to stone across the river. Next came the mighty and majestic dragon, who flew across the river. When asked why he was not first, he replied that he needed to make rain for the people of Earth and was thus delayed. His kindness earned him the fifth place in the cycle. During the dragon's explanation there was a galloping sound, signaling the arrival of the horse. Suddenly, hidden coiled around the leg of the horse, appeared the snake – nearly as cunning as the rat – who darted in front of the horse taking sixth place. The horse settled for seventh, just as a raft reached the shore with three more animals. The sheep (eighth), the monkey (ninth), and the rooster (tenth) had worked together to build a raft and traverse the river using their combined efforts. For this show of teamwork they were rewarded in the order that they stepped off of the raft. Next to arrive was the dog, who was met with questioning looks. Supposedly the best swimmer, the dog's lateness was due to his taking a bath in the refreshing waters of the river. His vanity nearly cost him the race. Lastly was the lazy pig, who stopped on the other side of the river for a feast before a attempted to cross, and was so weighed down by its meal that it arrived only moments before the Emperor declared the race to be finished.

Missing from this list of animals is the cat. Sadly, he was a victim of the rat's cunning; the day before the race the rat informed the cat that he would awaken him prior to the race, so as to allow the cat to rest and save its strength for the race. The day of the race arrived, and the cat continued to sleep while the rat took his spot atop the ox. When the cat awoke, the race was finished, and it has hated the rat for what it did ever since.

Beyond the twelve-year distinctions that the animals of the Zodiac lend to the calendar, there is an additional ten-year overlay of five elements: water, wood, fire, metal, and earth. Each of these elements occurs two years in a row, in balance with the Yang and Yin, the governing forces of all things. Even numbered years are considered Yang, and odd numbered years are considered Yin. When all factors are combined, a sixty-year repeating calendar results, the current cycle of which began in 1984.

Despite its complexity, the Calendar is followed to a certain degree, and the Chinese New Year is celebrated by many. Primary among the great astrological purposes to the Zodiac is the common belief that the animal that governs the time of a person's birth will influence that person's personality for life. Whether or not that is true is a matter of debate that is sure to continue for many years to come.

21. The passage primarily emphasizes the idea that:

- **A.** the animals that are included in the Chinese Zodiac calendar all had to find ways to reach the Emperor's Palace.
- **B.** the Chinese Zodiac calendar is correct in the long run, but somewhat distorted on a year-to-year basis.
- **C.** the Chinese Zodiac calendar is surrounded by myths and legends that still permeate Chinese society today.
- **D.** according to the Chinese Zodiac, the animal one is born under will directly influence that person's personality.

22. The passage begins with the phrase "Everyday, one takes for granted the ease of finding out what date it is" primarily to:

- **F.** draw the distinction between the ease of today's Gregorian calendar and the complexity of the Chinese Zodiac calendar.
- **G.** emphasize to the reader how effortless it is to use the Chinese Zodiac calendar to determine the current date.
- **H.** inform the reader that using a solar cycle to create a calendar is the simplest way to discern what the current date is.
- **J.** downplay the fact that the Chinese Zodiac calendar has a varying number of days each year while the Gregorian calendar does not.

23. In the context of the passage, the phrase "His vanity nearly cost him the race," suggests that the dog:

- **A.** felt that the water was so refreshing, he had no choice but to bathe in it whether it lost him the race or not.
- **B.** intended to look his best and be his cleanest when he reached the palace, in order to honor the Emperor.
- **C.** forgot that he was in a race to reach the Emperor's Palace until he saw the pig approaching the riverbank.
- **D.** prioritized his egotistical impulses over his desire to reach the Emperor's Palace on time.

24. As it is used throughout the passage, the word *cunning* most nearly means:
- **F.** ingenuity.
- **G.** dependability.
- **H.** apprehension.
- **J.** tolerance.

25. According to the passage, which of the following would NOT be a possible year of the Chinese Zodiac?
- **A.** Wood, Yang, dragon, 3028
- **B.** Yin, fire, pig, 3029
- **C.** Rat, earth, Yang, 3052
- **D.** Metal, Yin, tiger, 3030.

26. The narrator uses the example of the cat in the passage (lines 49–57) most likely in order to:
- **F.** accentuate the fact that many animals strove to earn the Emperor's distinction but only a select few attained it.
- **G.** highlight the fact that the rat was very shrewd and was only out for himself in the race to the Emperor's Palace.
- **H.** offer proof that the cat was one of the most indolent animals and therefore did not deserve the Emperor's great distinction.
- **J.** provide proof that, in actuality, the ox preferred the companionship of the rat to that of the cat.

27. It can be inferred from the passage that the Emperor most highly valued what traits among the animals?
- **A.** Deceitfulness and compassion.
- **B.** Goodwill and narcissism.
- **C.** Generosity and unanimity.
- **D.** Gluttony and collaboration.

28. According to the passage, all of the following are true regarding the animals that reached the Emperor's Palace EXCEPT:
- **F.** the rabbit was very nimble in crossing the river and made it across quite easily.
- **G.** the tiger's vigor allowed him to swim across the river effortlessly.
- **H.** the snake wound himself around the dragon's leg to reach the end of the race.
- **J.** the pig narrowly reached the end of the race to the Emperor's Palace.

29. As it is used in line 9, the word *mythological* most closely means:
- **A.** legitimate.
- **B.** bona fide.
- **C.** ludicrous.
- **D.** legendary.

30. It can be reasonably inferred from the passage's last sentence that the narrator:
- **F.** believes that the Chinese Zodiac influences the personality of those who believe in the astrology of the Chinese Zodiac system.
- **G.** does not have a rigid stance on the multitude of elements composing the Chinese Zodiac calendar and how these elements affect people.
- **H.** thinks that calendars are too intricate to ever fully grasp how and when the days of each year occur.
- **J.** is undecided as to whether or not the Chinese Zodiac system really has an effect on the calendar year.

PASSAGE IV

NATURAL SCIENCE: *The Eating Habits of Related Primates*

Scientists know very little about the eating habits of our ancestors who lived over two and a half million years ago. To solve this problem, scientists have started examining chimpanzees' hunting behavior and diet to find clues about our own prehistoric past.

It is not difficult to determine why studying chimpanzees might be beneficial. Modern humans and chimpanzees are actually very closely related. Experts believe that chimpanzees share about 98.5 percent of our DNA sequence. If this is true, humans are more closely related to chimpanzees than to any other animal species.

In the early 1960s, Dr. Jane Goodall began studying chimpanzees in Tanzania. Before the 1960s, scientists believed that chimpanzees were strict vegetarians. It was Goodall who first reported that meat was a natural part of the chimpanzee diet. In fact, Goodall discovered that chimpanzees are actually very proficient hunters. Individual chimpanzees have been known to hunt and eat more than 150 small animals each year. Among the chimpanzees' favorite prey are the red colobus monkey, feral pig, and various small antelope species. The red colobus monkey is one of the most important animals in the chimpanzees' diet. In one notable study, the red colobus monkey accounted for more than 80 percent of the animals eaten by one group of chimpanzees.

Despite these findings, scientists still maintain that chimpanzees are mostly fruit-eating creatures. In fact, meat composes only about 3 percent of the chimpanzee diet. This is substantially less than the quantity of meat consumed by the average human. Studies show that chimpanzees do most of their hunting in the dry season. August and September appear to be the most popular months for hunting. During the dry season, food shortages in the forest cause the chimpanzees' body weight to drop. Consequently, chimpanzees supplement their diets with meat. During the height of the dry season, the estimated meat intake is about 65 grams of meat per day for adult chimpanzees. This is comparable to the quantity of meat eaten by modern human societies whose members forage when other food sources are scarce. The chimpanzees' eating habits also closely resemble those of the early human hunter-gatherers.

Humans and chimpanzees are the only members of the Great Ape family that hunt and eat meat on a regular basis. However, like chimpanzees, humans are not truly carnivorous creatures. In fact, most ancient humans ate a diet composed mostly of plants, and even modern humans are considered omnivores because they eat fruits, vegetables, and meat.

Most people assume that food choices are based solely on nutritional costs and benefits. Although it is clear that the hunting habits of chimpanzees are guided mostly by nutritional needs, some aspects of the chimpanzees' behavior are not well explained by nutrition alone. Researchers suggest that chimpanzees might hunt for social gain. For instance, a male chimpanzee might try to demonstrate his competence to other male chimpanzees by killing prey. Chimpanzees may also use meat as a political tool to punish rivals and reward friends. However, a study also shows that female chimpanzees that receive large portions of meat after a hunt have healthier and stronger offspring. This indicates that there might be reproductive benefits to eating meat as well.

The information that scientists have been able to gather regarding chimpanzee hunting behavior is shedding some light on the eating habits of our ancestors. Further investigation is needed, however, to provide stronger evidence regarding this aspect of man's prehistoric past.

31. The main purpose of the passage is to:

- **A.** explore biological and physiological similarities between humans and chimpanzees.
- **B.** examine the hunting behavior and diet of chimpanzees and compare them to similar human activity.
- **C.** discuss the health benefits of hunting and eating meat while simultaneously predicting the effect of these behaviors on chimpanzee offspring.
- **D.** bring attention to the pioneering research of Dr. Jane Goodall in Tanzania.

32. It can be inferred from the passage that chimpanzees:

- **F.** find that the red colobus monkey is the easiest prey to hunt.
- **G.** only hunt when no other plant food is available.
- **H.** hunt only during the dry season when other food sources are scarce.
- **J.** vary their diet depending on environmental factors.

33. According to the passage, the word *proficient* (line 19) most nearly means:

- **A.** skilled.
- **B.** individual.
- **C.** incompetent.
- **D.** important.

34. According to the passage, which of the following statements regarding the eating habits of chimpanzees is true?

- **F.** Chimpanzee eating habits cannot be studied in the wild.
- **G.** Chimpanzee eating habits are directly influenced by social factors.
- **H.** It is not possible to determine the exact diet of chimpanzees.
- **J.** Chimpanzee eating habits are not related to those of humans.

35. Based on the context of the passage, the author most likely makes the comparison between chimpanzees and humans (lines 45–51) in order to suggest that:

A. chimpanzees are more similar to early humans than to modern humans.
B. studies of chimpanzees will contribute to an understanding of early humans.
C. early hunter-gatherers typically ate more meat than did chimpanzees.
D. data collected on chimpanzees cannot be applied to the study of humans.

36. As it is used in the passage, the word *forage* (line 42) most nearly means:

F. consume meats.
G. alter their diets.
H. search for food.
J. lose weight.

37. According to the passage, Dr. Jane Goodall's research was important because:

A. Dr. Goodall was the first scientists to study chimpanzees in their natural habitat.
B. Dr. Goodall discovered previously undocumented chimpanzee behavior.
C. Dr. Goodall had always argued that chimpanzees were actually carnivorous creatures.
D. Dr. Goodall discovered that red colobus monkeys make up 80% of chimpanzees' diets.

38. It can be inferred from the passage that ancient humans and chimpanzees:

F. share a DNA structure that is more similar than that of any two other animals.
G. only ate meat when fruit, grains, and vegetables were not available.
H. differ from other related species.
J. hunted for social gain and prestige in their communities.

39. According to the passage, chimpanzees hunt primarily because of:

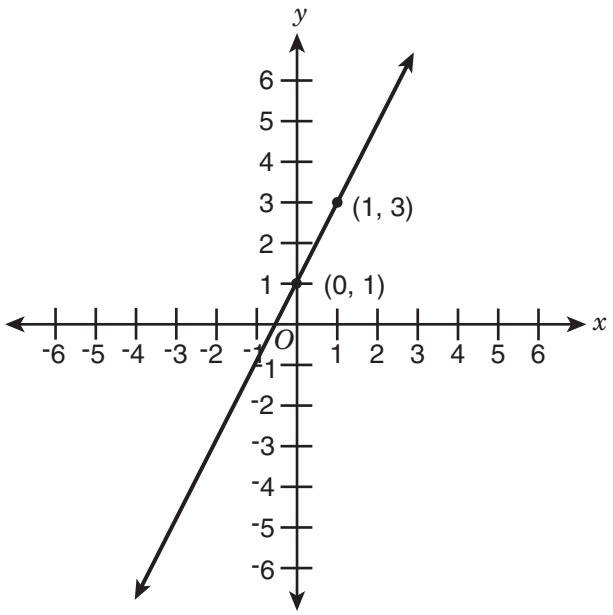
A. increased numbers of red colobus monkeys.
B. food shortages during the dry season.
C. their DNA sequence.
D. their preference for meat over plants.

40. In the context of the passage, the tone in lines 52–66 can best be described as:

F. affectionate.
G. humorous.
H. somber.
J. informational.

Section 1

1. A function is given on the coordinate plane.



The function is linear. What is the y-value for $x = -4$?

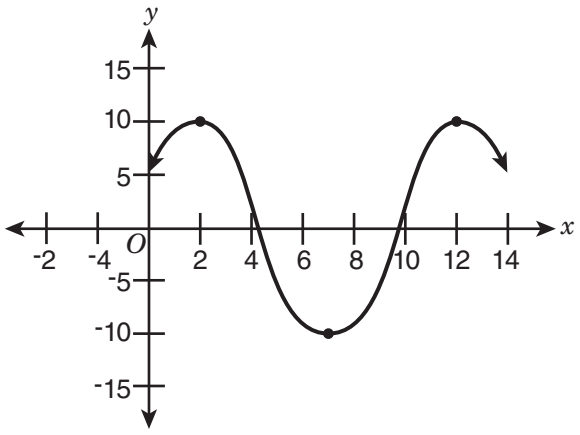
2.

$$y = \frac{3}{2}x - 1$$

$$x + 2y = 6$$

What is the value of x in the solution to the system of equations shown above?

3. What is the difference in x-values in the graph from where the function first begins decreasing to where it begins decreasing again?



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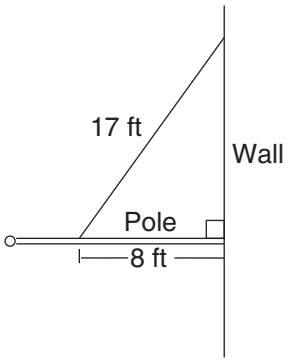
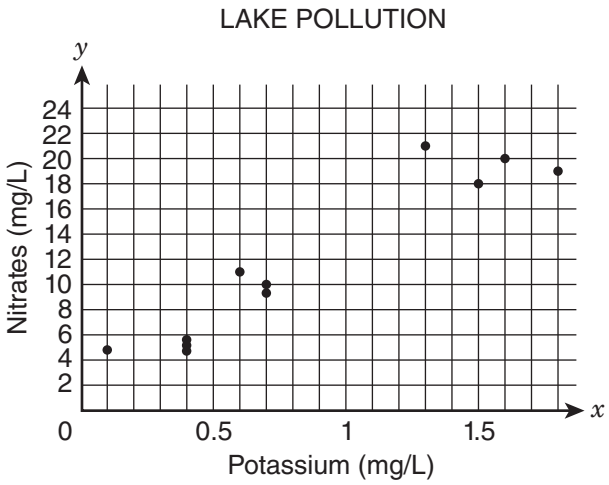


The diagram above shows a pole connected to a wall at a 90° angle. A 17-foot wire is attached to the pole at a point 8 feet out from the wall. How many feet above the pole is the wire attached to the wall?

A. 9
B. 13
C. 15
D. 16

5. A researcher recorded pollution data that measured the presence of potassium and nitrates in some lakes. The scatter plot shows the data.



Which statement describes the data shown in the graph?

A. The data show a nonlinear association.
B. The data show multiple outliers.
C. The data show a positive association.
D. The data show a negative association.

6. How much greater is $\left(1.8 \times 10^6\right)$ than $\left(7.3 \times 10^5\right)$?

A. 1.07×10^5

B. 1.13×10^5

C. 1.07×10^6

D. 1.13×10^6

7. How is $0.\overline{6} \times 0.\overline{2}$ written as a fraction in simplest form?

A. $\frac{4}{27}$

B. $\frac{2}{15}$

C. $\frac{4}{33}$

D. $\frac{3}{25}$

8. If $2x - 6 = 8y - 10$ and $x > 5$, what is the **least** possible integer value of y?

A. 1
B. 2
C. 3
D. 6

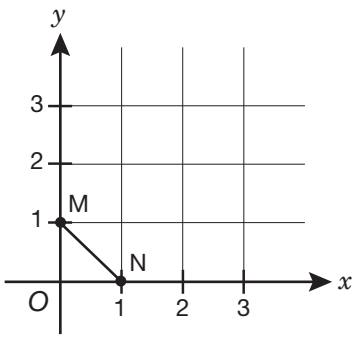
9. A data set relates a car's average gas mileage, y, in miles per gallon, to its engine size, x, in liters. The equation for the line of best fit is $y = -3.25x + 34.5$. What is the meaning of the slope of the line as it relates to gas mileage and engine size?

A. For each decrease of 1 L in engine size, the gas mileage decreases by 3.25 mpg.
B. For each increase of 1 L in engine size, the gas mileage decreases by 3.25 mpg.
C. For each increase of 1 mpg in gas mileage, the engine size decreases by 3.25 L.
D. For each decrease of 3.25 mpg in gas mileage, the engine size decreases by 1 L.

10. On Saturday, the temperature changed at a constant rate from 2:00 a.m. until 2:00 p.m. At 4:00 a.m., the temperature was 47° F. At 10:00 a.m., the temperature was 32° F. What was the temperature at 2:00 a.m. on Saturday?

A. 15° F
B. 37° F
C. 42° F
D. 52° F

11.



If $\overline{MN}$ is rotated 90° clockwise about the origin, what are the coordinates of N′?

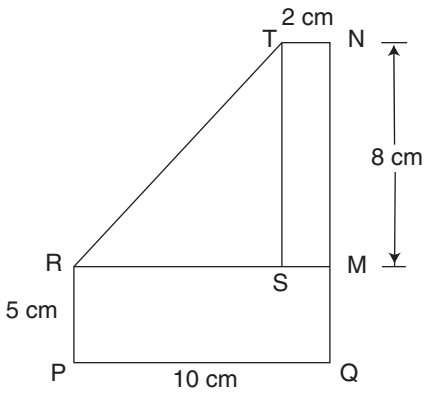
A. $(1, 0)$

B. $(0, 1)$

C. $(0, -1)$

D. $(-1, 0)$

12.



In the diagram above, STNM and PRMQ are rectangles, and point S is on $\overline{RM}$. What is the length of $\overline{RT}$, in centimeters?

A. 8

B. $\sqrt{80}$

C. 10

D. $\sqrt{128}$

13. $$N = \sqrt{y + (2x - 1)^2}$$

In the equation shown above, $y > 0$ and $N \geq 0$. What value of x will result in the **least** possible value of N?

A. $-\frac{1}{2}$

B. 0

C. $\frac{1}{4}$

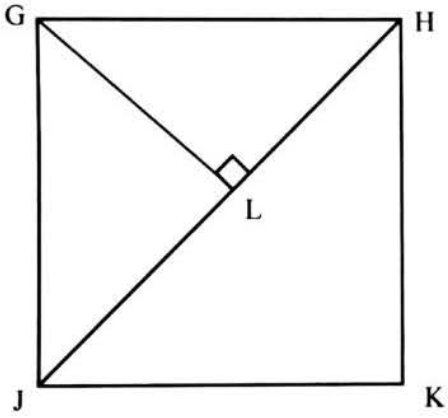
D. $\frac{1}{2}$

Area & Perimeter

1. A rectangle has a perimeter of 28 feet. If the length is 4 feet, what is the area?

A. 22 sq. ft.
B. 28 sq. ft.
C. 40 sq. ft.
D. 96 sq. ft.

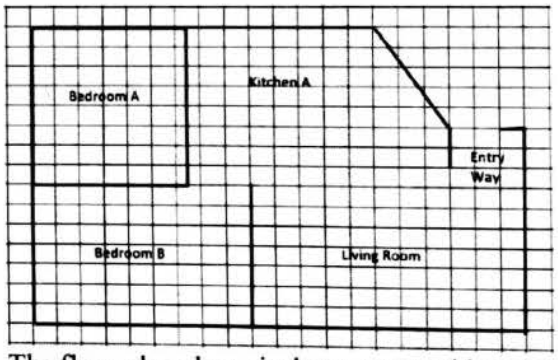
3.



The area of the square above is 72 square centimeters. GL is half the length of HJ, which divides the square exactly in half. What is the length of GL?

A. 6 cm
B. 8 cm
C. 18 cm
D. 36 cm

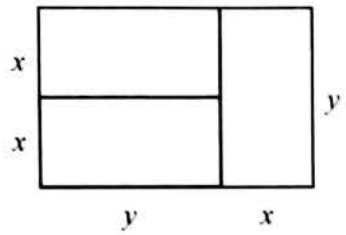
5.



The floor plan above is drawn on a grid made of 1-inch squares. Each square represents 9 square feet. About how many square yards of carpet are needed to cover Bedroom A?

A. 52 sq. yds.
B. 156 sq. yds.
C. 468 sq. yds.
D. 1,404 sq. yds.

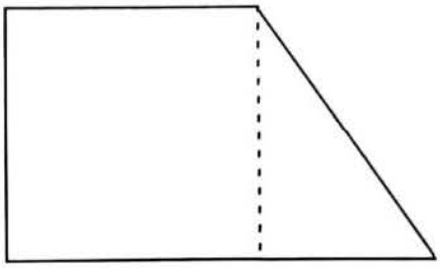
7.



Tiles come prefabricated in rectangular sets of three, in the orientation shown above. These sets are used to tile a rectangular area measuring $8y$ by $9x$. How many sets are needed to tile this area?

A. 12
B. 24
C. 36
D. 48

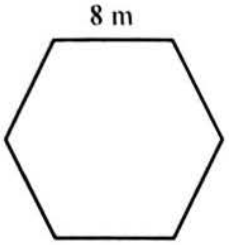
9.



In the above figure, the square has an area of 16. The perimeter of the triangle is 12. What is the perimeter of the trapezoid outlined by the solid line?

A. 20
B. 24
C. 26
D. 28

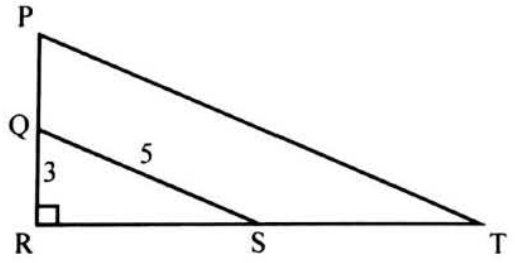
11. A square (not shown) has the same perimeter as the regular hexagon shown below.



What is the area of the square?

A. 36 sq. m
B. 48 sq. m
C. 64 sq. m
D. 144 sq. m

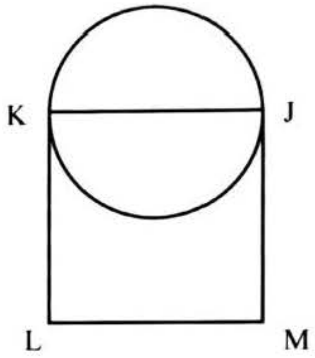
13.



In the above figure, Q bisects $\overline{PR}$, and S bisects $\overline{RT}$. What is the perimeter of quadrilateral PQST?

A. 21
B. 22
C. 23
D. 24

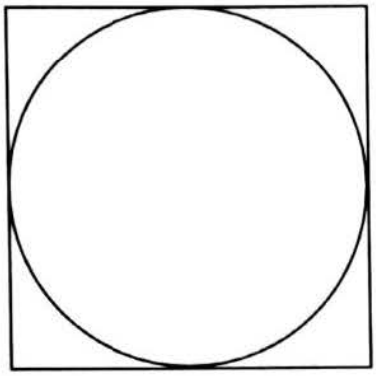
15.



The figure shows square JKLM. The circle has endpoints at J and K. If the square has a perimeter of 16 cm, what is the circumference of the circle?

A. 2π
B. 4π
C. 6π
D. 8π

17.



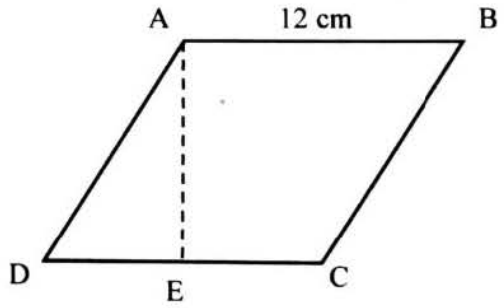
A circle is inscribed in a square, as shown above. If the area of the circle is 64π sq. cm., what is the area of the square?

A. 32 sq. cm
B. 64 sq. cm
C. 128 sq. cm
D. 256 sq. cm

19. A painter is calculating how much paint he will need to cover a cylindrical foam roller (including both ends of the roller). The roller is 10 inches long and has a diameter of 4 inches. What is the surface area of the foam roller?

A. 40π sq. in.
B. 48π sq. in.
C. 64π sq. in.
D. 96π sq. in.

21.



If the area of triangle ADE is 24 cm^2, and E is the midpoint of DC, what is the area of parallelogram ABCD?

A. 48 cm^2
B. 96 cm^2
C. 120 cm^2
D. 144 cm^2

23. A regular pentagon has a side length of 8 inches. A square has the same perimeter as the pentagon. What is the area of the square?

25. A rectangle has an area of 24 square inches. If all four side lengths are integers, how many possible different perimeters could this rectangle have?

27. A parallelogram has vertices at (4, 2), (10, 2), (8, 9), and (14, 9). What is the area of the parallelogram?

Volume

1. The floor of a rectangular swimming pool has an area of 350 sq. meters, and every point on the floor is of equal depth. If 4,200 cubic meters of water is poured into the pool, how deep will the water level be?

A. 6 m
B. 12 m
C. 24 m
D. 36 m

3. At a packaging and shipping warehouse, packages that await shipment are stored in a storage area measuring 16 feet long, 24 feet wide, and 4 feet high. All packages in this warehouse are cubical, measuring 2 feet on all sides. How many packages can be stored in the storage area?

A. 96
B. 192
C. 768
D. 1,536

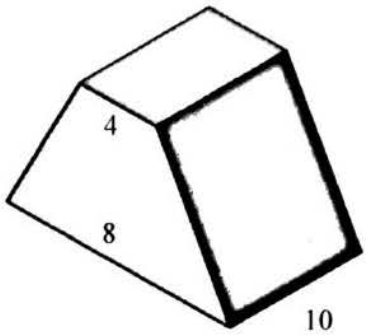
5. A pyramid has a triangular base. Its volume is 36 cubic inches. The base is an equilateral triangle with an area of 12 square inches. What is the height of the pyramid?

A. 3 in.
B. 6 in.
C. 9 in.
D. 12 in.

7. Fancy Cakes bakery has been asked to create a customized cake in the shape of a rectangular pyramid. The volume of the cake must contain 144 cubic inches of cake. The customer specified that the cake must be exactly 9 inches high. Which of the following could be the dimensions of the rectangular base of the cake?

A. 4 in. by 4 in.
B. 5 in. by 6 in.
C. 6 in. by 7 in.
D. 6 in. by 8 in.

9. What is the volume of the trapezoidal prism shown below, if it has a height of 5?



A. 280 cubic units
B. 300 cubic units
C. 320 cubic units
D. 1,600cubic units

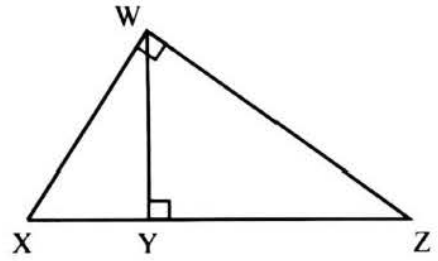
11. A box measures 24 inches long, 20 inches deep, and 16 inches high. How many cubes with side length of 2 inches can fit in the box?

13. The base of a cone is a circle with radius 4 mm. If the volume is 16π mm^3, what is the height, in millimeters?

15. A square pyramid has a height of 6 meters and a volume of 32 meters^3. What is the side length of its base?

Triangles

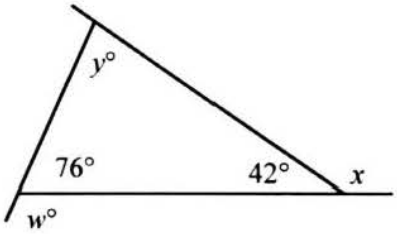
1.



The longest side in the above figure is

A. WZ
B. XZ
C. YZ
D. WX

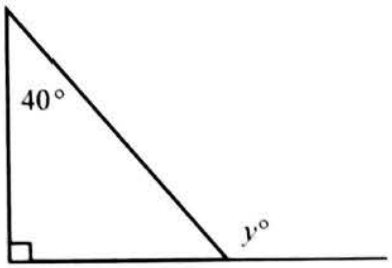
3.



In the above figure, what is the value of $w° + x° + y°$?

A. 118°
B. 180°
C. 298°
D. 304°

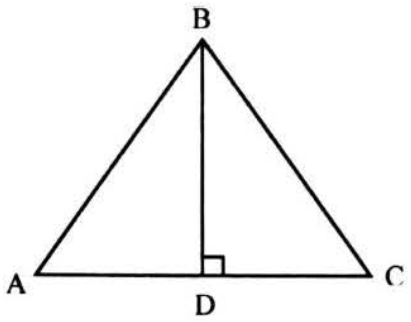
5.



What is the value of y?

A. 40
B. 50
C. 130
D. 145

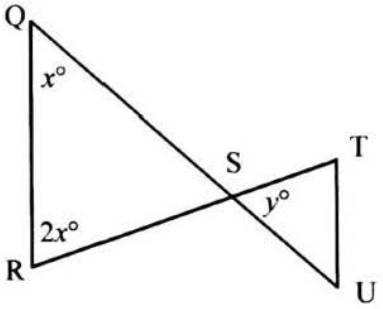
7.



In the diagram above, D is the midpoint on side AC of equilateral triangle ABC. What is the measure of ∠DBC?

A. 15°
B. 30°
C. 45°
D. 60°

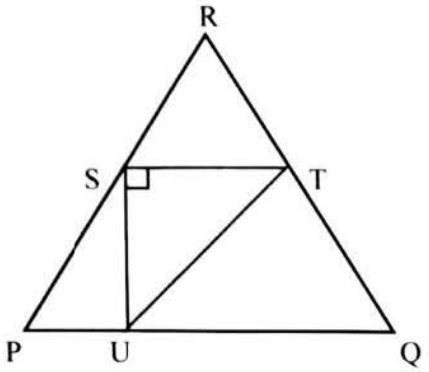
9.



If $x = 35$ what is the value of y?

A. 70
B. 75
C. 105
D. 145

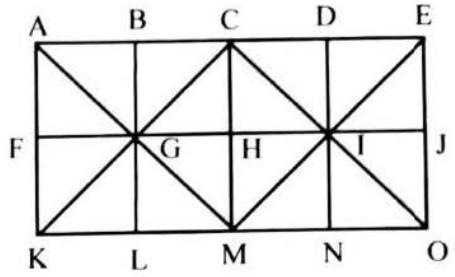
11.



In the figure shown above, PQ = QR = PR. If the measure of $\angle RST = 60°$, and ST = SU, what must be the measure of $\angle UTQ$?

A. 45°
B. 60°
C. 75°
D. 105°

13.

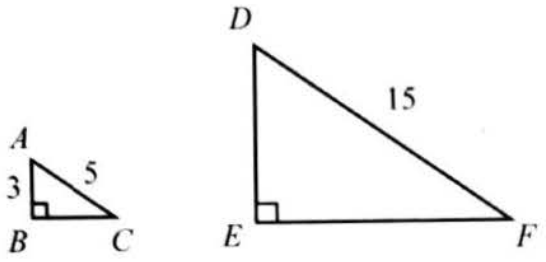


The figure above is made up of 16 small right triangles. How many triangles are congruent to triangle AKM? (Do not count AKM itself.)

A. 3
B. 7
C. 16
D. 19

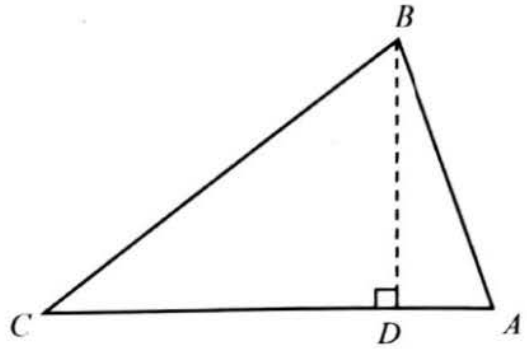
Grid-In Questions (Open-Ended Questions)

15.



Triangles ABC and DEF are similar. How many units long is EF?

17.



The area of triangle ABC is 84 square units. If $AC = 14$ units, what is the length of BD, in units?

Circles

1. If there are 120 degrees of arc in $\frac{1}{3}$ of a circle, how many more degrees of arc are there in $\frac{5}{6}$ of a circle?

A. 120°
B. 180°
C. 240°
D. 300°

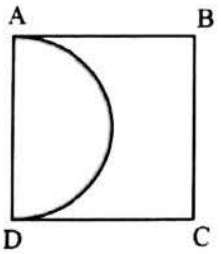
3. A circle has a circumference of q square feet. If the radius of the circle is 4, what is the value of q?

A. 2π
B. 4π
C. 8
D. 8π

5. The tire of a tractor is 4 feet in diameter. Approximately how many feet does the tire move in a single revolution?

A. 4.0 ft.
B. 8.0 ft.
C. 12.5 ft.
D. 16.0 ft.

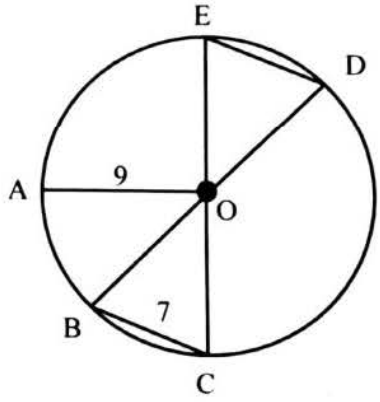
7.



In square ABCD above, arc AD represents a half circle. Each side of square ABCD has a length of 2. What is the area of the shaded region?

A. π
B. $\frac{\pi}{4}$
C. $\frac{\pi}{2}$
D. $2 + \pi$

9.



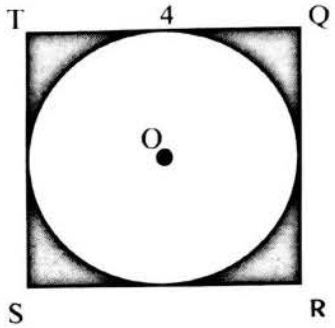
In the above figure, O is the center of the circle. Segments $\overline{EC}$ and $\overline{BD}$ are diameters of the circle, and $\overline{AO}$ represents the radius. Which of the following statements is true?

A. $\overline{EC} = 9$
B. $\overline{ED} = 9$
C. $2\overline{AO} = \overline{ED} + \overline{BC}$
D. $2\overline{AO} = \overline{EC} = \overline{BD}$

11. Circle A has a circumference of 8π. The radius of circle B is twice the radius of circle A. What is the area of circle B?

A. 8π
B. 32π
C. 64π
D. 256π

13.



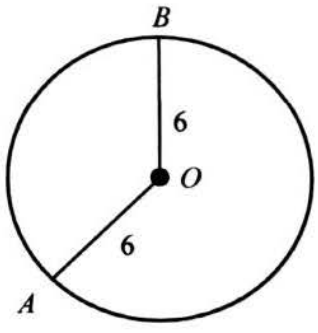
A circle with center O is inscribed inside of square QRST. What is the area of the shaded portion of the square?

A. $1 - \pi$
B. $4 - \pi$
C. $16 - 4\pi$
D. $16 - 16\pi$

Grid-In Questions (Open-Ended Questions)

15. Circle O (not shown) has an area of 81π square units. Circle P has a radius that is 2 units shorter than the radius of circle O. What is the diameter of circle P, in units?

17.



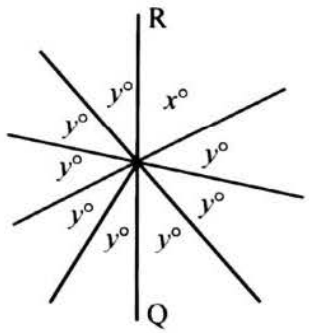
Arc AB has a measure of 4π units. What is the measure of angle AOB, in degrees?

Angles

1. G is a point on line l. How many lines can be drawn through G that form a 90° angle with line l?

A. 0
B. 1
C. 2
D. The number varies.

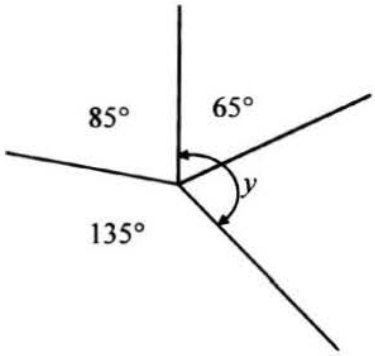
3.



In the above figure, QR is a line. What is the value of x?

A. 36
B. 40
C. 45
D. 72

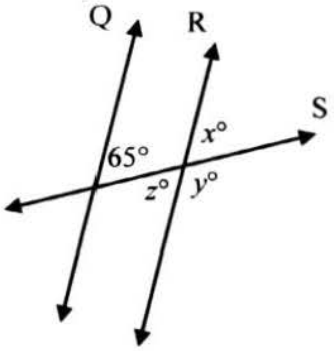
5.



In the above figure, what is the degree measure of arc y?

A. 75°
B. 135°
C. 140°
D. 150°

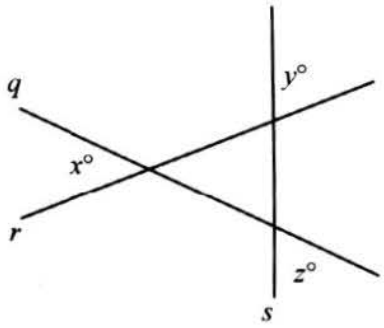
7.



In the above figure, lines Q and R are parallel. What is the sum of $x + y + z$?

A. 195°
B. 245°
C. 295°
D. 345°

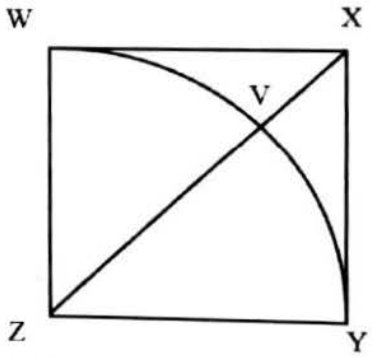
9.



In the above figure, if $x = 40$, what is the value of $y + z$?

A. 40°
B. 80°
C. 120°
D. 140°

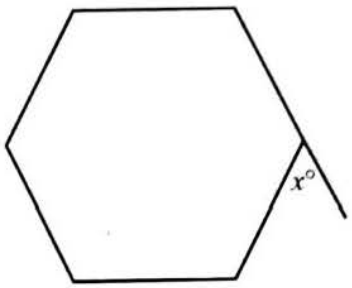
11.



In the diagram above, WXYZ is a square. WVY is an arc of a circle centered at Z. XZ is a line segment that intersects the arc at point V. Find the measure of $\angle ZWV$ (not shown).

A. 45°
B. 60°
C. 67.5°
D. 84.5°

13.



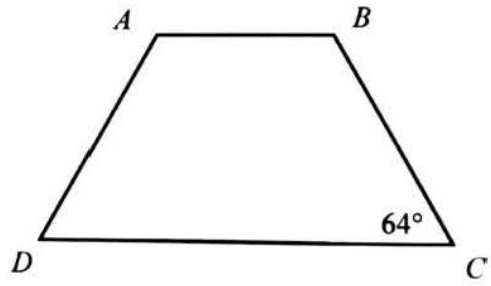
If the above figure is a regular hexagon, then $x =$

A. 45°
B. 60°
C. 72°
D. 120°

Grid-In Questions (Open-Ended Questions)

15. What is the average measure, in degrees, of each angle in a hexagon?

17.



ABCD is an isosceles trapezoid. What is the sum of *ABCD*'s two largest angles, in degrees?